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Research Paper Title: “**Integration of Technology in Online and Distance Learning**”

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DECLARATION

I, the undersigned, hereby would like to explicitly state that the write-up titled, “**Integration of Technology in Online and Distance Learning**” is original and has not been published earlier, or that it is not under consideration for possible publication elsewhere.

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Integration of Technology in Online and Distance Learning

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Abstract:

In a recently published National Education Policy 2020 (NEP-2020) for India, aggressive goal was set to achieve 100% Gross Enrolment Ratio (GER) in preschool to secondary level by 2030. Online and Distance Learning plays a vital role in achieving this challenging goal. Integration of Technology in Online and Distance Learning can make this goal feasible.

Online Distance Learning (ODL), which is also known as e-learning, distance education or online learning, is a method of education in which teachers and students are physically separated during teaching-learning process. Application of integrated technologies makes it possible to connect and facilitate the required seamless communication between the teacher-student and student-student.

As ODL is convenient, economic and flexible, it is gaining more and more popularity; especially during this COVID-19 pandemic (where social distancing is

essential), the world is witnessing the significance of ODL at all the levels of education.

This paper illustrates enabler technologies with integration of these technologies in ODL.

Keywords:

Online Distance Learning (ODL), National Education Policy (NEP), Information and Communication Technology (ICT), Learning Management System (LMS), Integration, Pedagogy

Introduction

Every student has a distinct learning style (Dyer, T., Larson, E., Steele, J., & Holbeck, R., 2015) and hence conveying the concepts of lesson in an interesting format which would appeal most of the students is really tough task. Technology can make this task possible by increasing the course delivery options with well-designed multimedia

configurable resources. In addition to the traditional method of reading the text, many additional options are now available to students. These make the (virtual) classroom more interactive and assists the students with learning the content. Probably this shall help prevent the students from dropping out and ultimately help achieve the expected GER.

There is a sudden and amassed growth in on-line courses due to COVID circumstances. However, this has certainly increased the expectations and demands of including visual, kinesthetic, textual and auditory delivery in ODL; identification of appropriate integrated technologies making it possible to meet these aggressive demands.

Historical Background

According to Dyer et al. (2015), the integration of technology is possible via collaborative approach with following major features such as share purpose, focused cycle of inquiry, frequent dialogue, decision making process, intentional actions and evaluation. He further stated that what, where and how the information is being conveyed to students is determined by the

technology to achieve more learning styles, high level of student engagement and high student outcome.

Marsap & Narin (2009) in their article explained the evolution of distance learning application initiated in year 1840 where Isaac Pitman started to teach the steno remotely using letters. According to him, scripts and visual approach are needed for interaction, participation and creativity in the distance learning which can be feasible by applying the appropriate technology.

In the article 'Role of Technical and Vocational Education and Training (TVET) in Sustaining and Enhancing the Quality of Education' (Chinchorkar, 2010), the effective use of Information and Communication Technology (ICT) in understanding the learning and broadening the assessment is explained well which is applicable to ODL.

Collaboration within constraints of time and place (Beldarrain, 2006) is being achieved using blogs, wikis, podcasts and social media which is further extended with chat-room, discussion boards, podcasts such as vblogs and audioblogs, RSS feed and web pages. The strong relationship between technology and interactions was established and explained as how the records of an

individual (such as progress, accomplishments and reflections) can be maintained using technology. Because the sense of belonging or 'presence' adds the comfort to instructors and students while interacting. Seven principles that technology should adopt were explained as: 1. Encourage contact between students and faculty. 2. Develop reciprocity and cooperation among students. 3. Use active learning techniques. 4. Give prompt feedback. 5. Emphasize time on task. 6. Communicate high expectations. 7. Respect diverse talents and ways of learning. According to him, instructional theory is learning outcome based, whereas learning theory is about how the learning happens and technology impact social interaction and affect learning process. Learner-focus-system is focused on customization and not on the standardization of content. The customization is based on cultural diversity, learning preferences and ability level.

Types of major distance learning (Stern, 2018) is listed as follows and suggested various Course Management Systems (CMS) with seven principles of good teaching:

- Correspondence Course: Using regular mails

- Telecourses: Using radio and TV
- CD ROM Courses: Using static computer
- Online Learning: Internet based
- Mobile Learning: Cellular phone and PDA

Technology can be used in five key levels of education as follows:

1. Presentation level
2. Demonstration level
3. Drill and practice level
4. Interaction level
5. Collaboration level

The generic model of teaching-learning (Wang, 2008) is defined with three essential components as: 1. Pedagogy 2. Social interaction and 3. Technology (as interaction with interfaces). It is stated that the usefulness of technology depends upon the utility and its usability.

On-line learning is feasible using Internet, however conducting laboratory courses is still the most challenging part. Ndahi (2006) in his article explained how the laboratory courses can be offered and delivered specifically in the Distance Education. According to him, by distributing the learning-kits the demonstration labs and

support service can make it possible to conduct even laboratory courses on-line.

Extensive collection of reviews and annotated bibliography on e-learning (Lodhia, 2006) illustrate the higher education environment and challenges specifically in Africa.

National Education Policy (NEP-2020) of India dedicated separate module on “Technology Use and Integration” which elaborated the prevailing Technology enabled platforms such as SWAYAM and DIKSHA. National Education Technology Forum (NETF), which is an autonomous body for free exchange of ideas and usage, was constituted for ensuring the equitable use of technology using online and digital education. The pilot studies, digital infrastructure, online platforms, digital repository, digital divide, virtual labs, training and incentives for teachers were explained with various models of learning and making standard digital capability.

The differentiation between campus and distance education (Traxler, 2018) made it clear by stating that the boundaries between online, e-learning, virtual learning are going to be blur. Traxler (2018) also explained the variation between formal and informal learning in terms of delivery modalities,

pedagogies, epistemologies and cultures. According to him, the activities such as accreditation, qualification, assessment and grading are involved more in the formal learning.

Bogdanović (2012) in his article explained about the multimedia Learning Management System (LMS) along with the extensive list of books on e-education that consists of e-learning on cloud and Information and Communication Technology (ICT) and related technical support.

Technical framework seeking an integrated model (Picciano, 2017) based on three-part taxonomy first proposed by Gibbons and Bunderson as explore, explain and design. Enhanced further as Bloom’s taxonomy based on six key elements as creating, evaluating, analyzing, applying, understanding and remembering. He suggested three innovative models as follows:

- Community of inquiry model: Includes three ‘presence’ as cognitive, social and teaching
- Connectivism model: Consists of application of tools such as MOOCS
- Online collaborative learning: Having three elements as idea

generation, idea organizing and intellectual convergence

Role of ODL in education:

Education is treated as engine of growth. This capacity of applying the knowledge and creating the value in very large scale is being built by ODL.

In his article, Traxler (2018) explained the definition and purpose of distance learning with future predictions and possibilities. He differentiated campus education and distance learning as one happens on campus or within campus universities, the other does not. It is well accepted that the basic purpose of education is to service economies and put learners into employment, specifically the cash economies and paid employment where ODL plays significant role.

Application and integration of technology has given tremendous power to ODL to achieve this basic purpose of education.

Integration of technology in ODL:

Technology is not limited to only devices and infrastructure involved in ODL but it also includes the integration with software, systems and services. The integration of systems for the activities such as admission, lesson delivery, examination/evaluation and award/certification (Venkata Subrahmanyam

& Ravichandran, 2013) enhances the performance of ODL. Such systems include:

- Admission Management System (AMS): consists of test and registration formalities
- Financial Management System (FMS): includes fee and scholarship details
- Learning Management System (LMS) that includes
 - Learning Content Management System (LCMS): includes teaching material
 - Computer Aided Assessment (CAA): use of computers in teaching-learning
 - Electronic Performance Support System (EPSS): evaluation and assessment
- Integrated Course Management System (ICMS): Consolidation of courses

Such integration of systems builds social interactions in constructive learning environment that prepares the students to be life-long learners.

Challenges and Solutions: Roadmap Ahead

The Online Education evolved with the many challenges faced in every generation and accordingly the relevant technical solutions for these challenges were proposed.

The First Generation (1850-1960) of Online Education consists of print, radio and TV media (Sadeghi, 2019). Print media as asynchronous model met the challenges of delayed response, whereas the media like radio and TV were limited to unilateral direction.

The Second Generation (1960-1985) includes technology without computers such as audio cassettes, fax and mix-media. These technologies faced the challenges of scalability and tasks to keep the content updated.

The Third Generation (1985 onwards) is based on the Internet with various advantages over earlier generations such as study is possible from anywhere, anytime. It saves large amount of money and time without commuting, has flexibility to choose, gives opportunity to earn while you learn.

However, this Third Generation of Online Learning is also facing many challenges as follows:

- High probability of distraction: Dependency on the internet can create disturbance due to issues such as poor connectivity.
- Complicated technology: Usage of various features and functions of different online platforms becomes online classes intricate.
- Absence of social interactions: Learning is a process in which social interactions play a vital role. In online education, there is limitation on social interactions.
- No natural contact with instructors: Natural contact with instructors accelerate the learning process. Online education has serious limitation on natural contact.
- Job market may not recognize the qualifications acquired through online education: Many industries prefer hands-on skills, which may be difficult to acquire through online education.

Depending upon the challenges and specific requirements the solutions can be as follows:

- Extending the training to teachers and students on specific technology usage
- Implementation of virtual classrooms and shift to upcoming internet technology such as 5G
- Application of platforms such as Moodle for sharing the learning material
- Include simulation techniques, game-based learning
- Develop adoptive learning which provides personalization and data-driven approaches
- Preparation of asynchronous videos and share the same with students
- Introduction of advanced proctored tests for assessment and evaluation
- Realization of fact (specifically in this COVID-19 situation) and convincing industry about significance of online education which may improve the job market.

Traxler (2018) classified the challenges as solvable, difficult and wicked and he suggested the technologies as solution for different horizons as follows:

Near Horizon	Medium Horizon	Future Horizon
Adoptive Learning	Internet of Things (IoT)	Artificial Intelligence (AI)
Mobile Learning	Learning Management System (LMS)	Natural User Interfaces

The future of online learning (Milakovich & Wise, 2019) completely depends upon the development of new technologies that includes communication bandwidth, processing that includes virtual machines (VM), memory and storage, software and specialization. Accordingly, the handsets with widgets and webtops with embedded system shall explore the display technology, portable, personal and global presentation software with games and simulation.

The blended learning approach will be adopted in future (Georgiadou & Siakas, 2006) in which the drivers for change will be as follows:

- Funding imperative: Depending upon the strategies of institutions and funds availability
- Learner's needs: Each student may have unique learning need, must prioritize
- Stakeholder's demands: The expectations from the parties involved to be considered
- Career opportunities: Industries need to be convinced with demonstration of needed skills
- Quality standards: The norms of frameworks must be followed

The learner's needs and stakeholder's demands should be considered first, followed by career opportunities and strategies. Quality standards should be fine-tuned to fit these goals.

Conclusion:

Specific recommendations to improve ODL operations are as follows:

- Invest more in the Information Technology Infrastructure

- Integrate all related relevant services to get better throughput
- Embracing the hybrid/blended approach is recommended
- Explore the blogging to for increasing the reach
- Adopt social networking for appropriate communication

Integration of Technology in Online and Distance Learning is contributing not only in making the geographical separations blur but creates more spaces such as cyber-spaces, phone-spaces. This causes decline in the political, economic, social and ecological differences in communities. Technology integration in online and distance learning shall impact not only the education sector but influence the service economy and cash economy with shattering the labor/job market.

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